FIG. 1

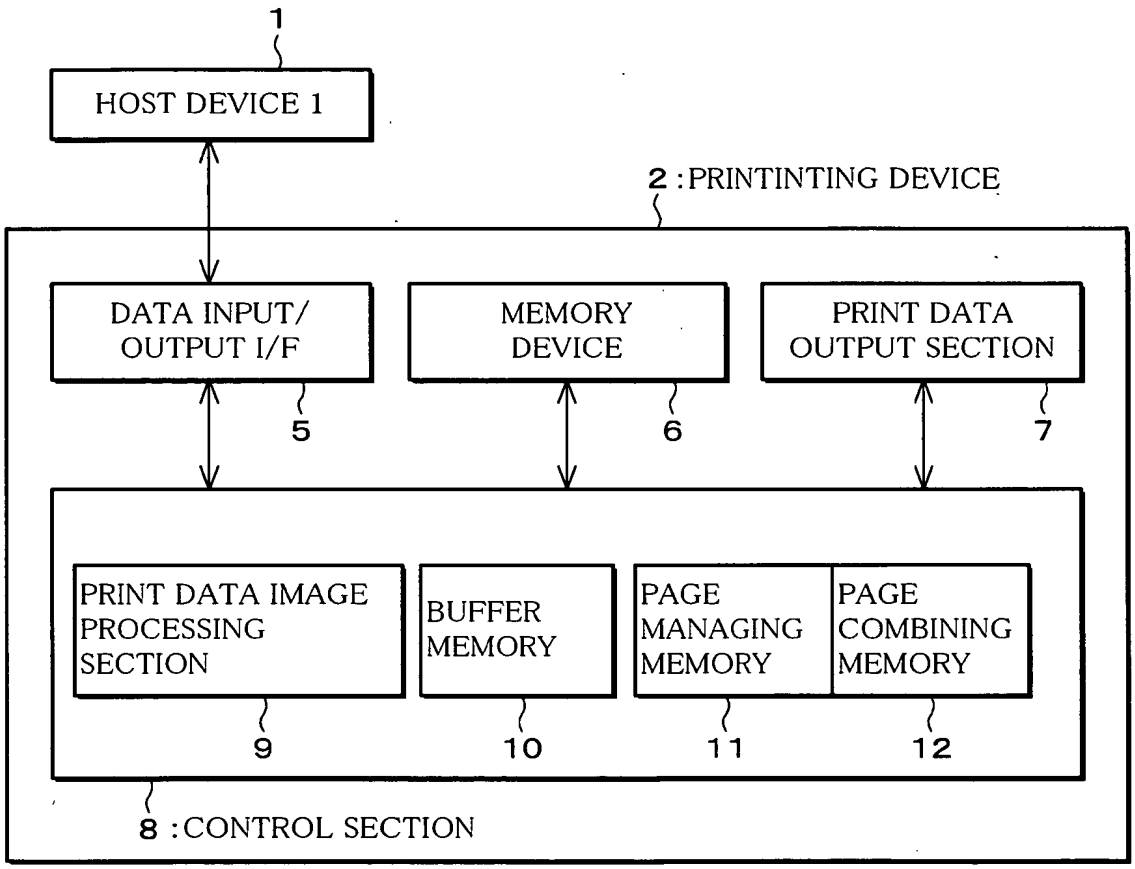

1
HOST DEVICE 1
2 : PRINTINTING DEVICE
DATA INPUT/ OUTPUT I/F
MEMORY DEVICE
PRINT DATA OUTPUT SECTION
5
6
7
PRINT DATA IMAGE PROCESSING SECTION
BUFFER MEMORY
PAGE MANAGING MEMORY
PAGE COMBINING MEMORY
9
10
11
12
8 : CONTROL SECTION

FIG. 2

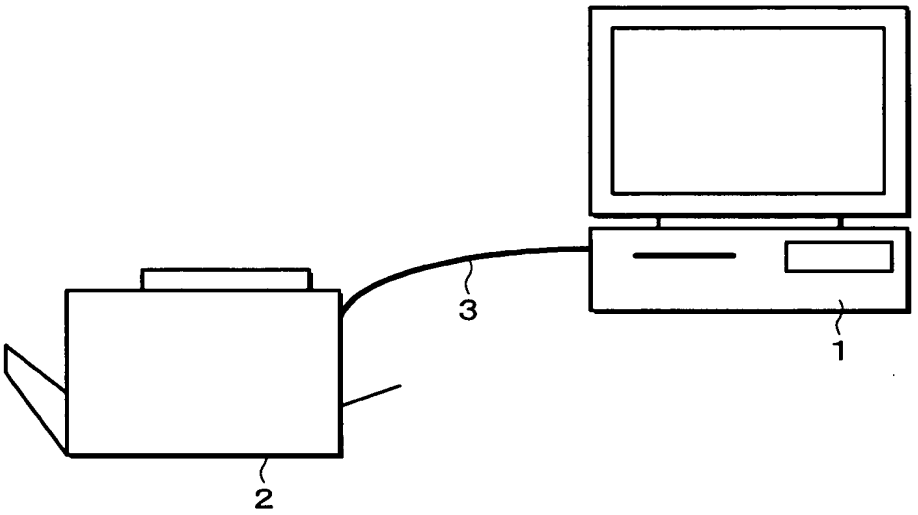


FIG. 3

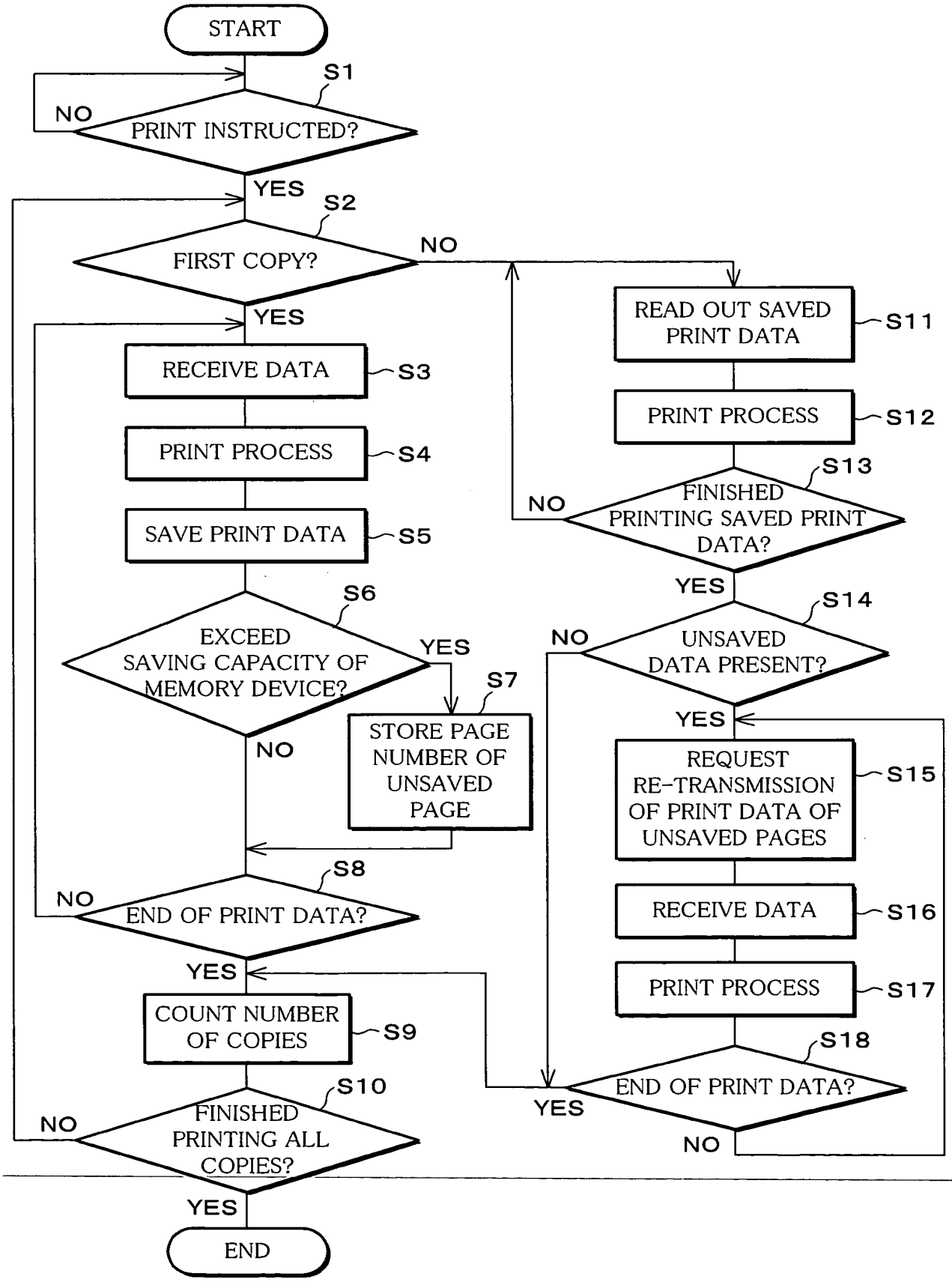

START
S1
PRINT INSTRUCTED?
NO
YES
S2
FIRST COPY?
NO
YES
RECEIVE DATA
S3
PRINT PROCESS
S4
SAVE PRINT DATA
S5
S6
EXCEED SAVING CAPACITY OF MEMORY DEVICE?
YES
S7
STORE PAGE NUMBER OF UNSAVED PAGE
NO
S8
END OF PRINT DATA?
NO
YES
COUNT NUMBER OF COPIES
S9
S10
FINISHED PRINTING ALL COPIES?
NO
YES
END
READ OUT SAVED PRINT DATA
S11
PRINT PROCESS
S12
S13
FINISHED PRINTING SAVED PRINT DATA?
NO
YES
S14
UNSAVED DATA PRESENT?
NO
YES
REQUEST RE-TRANSMISSION OF PRINT DATA OF UNSAVED PAGES
S15
RECEIVE DATA
S16
PRINT PROCESS
S17
S18
END OF PRINT DATA?
YES
NO

FIG. 4

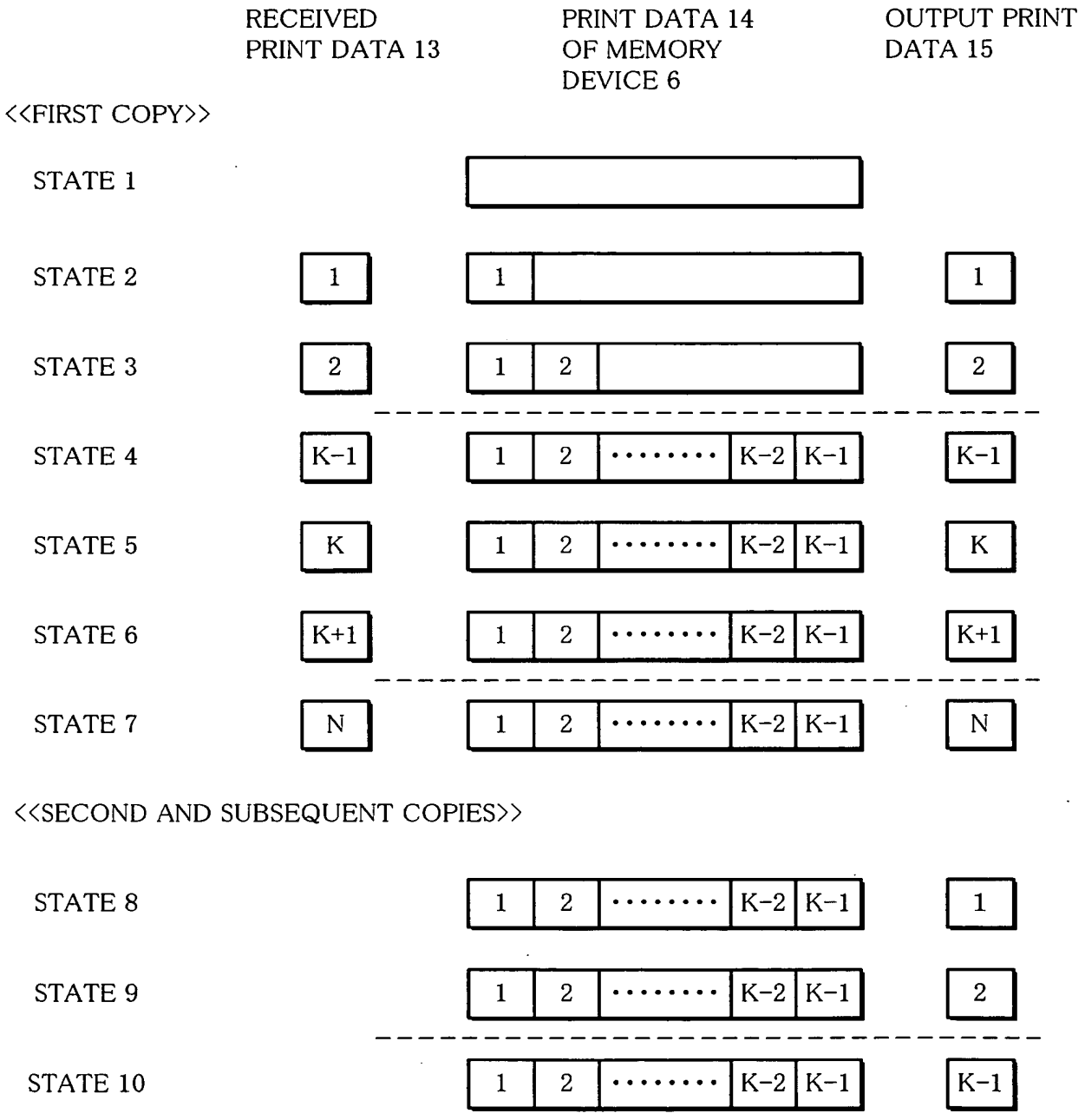

RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE 6
OUTPUT PRINT DATA 15
<<FIRST COPY>>
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
STATE 6
STATE 7
1
2
K-1
K
K+1
N
1
2
K-2
K-1
<<SECOND AND SUBSEQUENT COPIES>>
STATE 8
STATE 9
STATE 10

FIG. 5

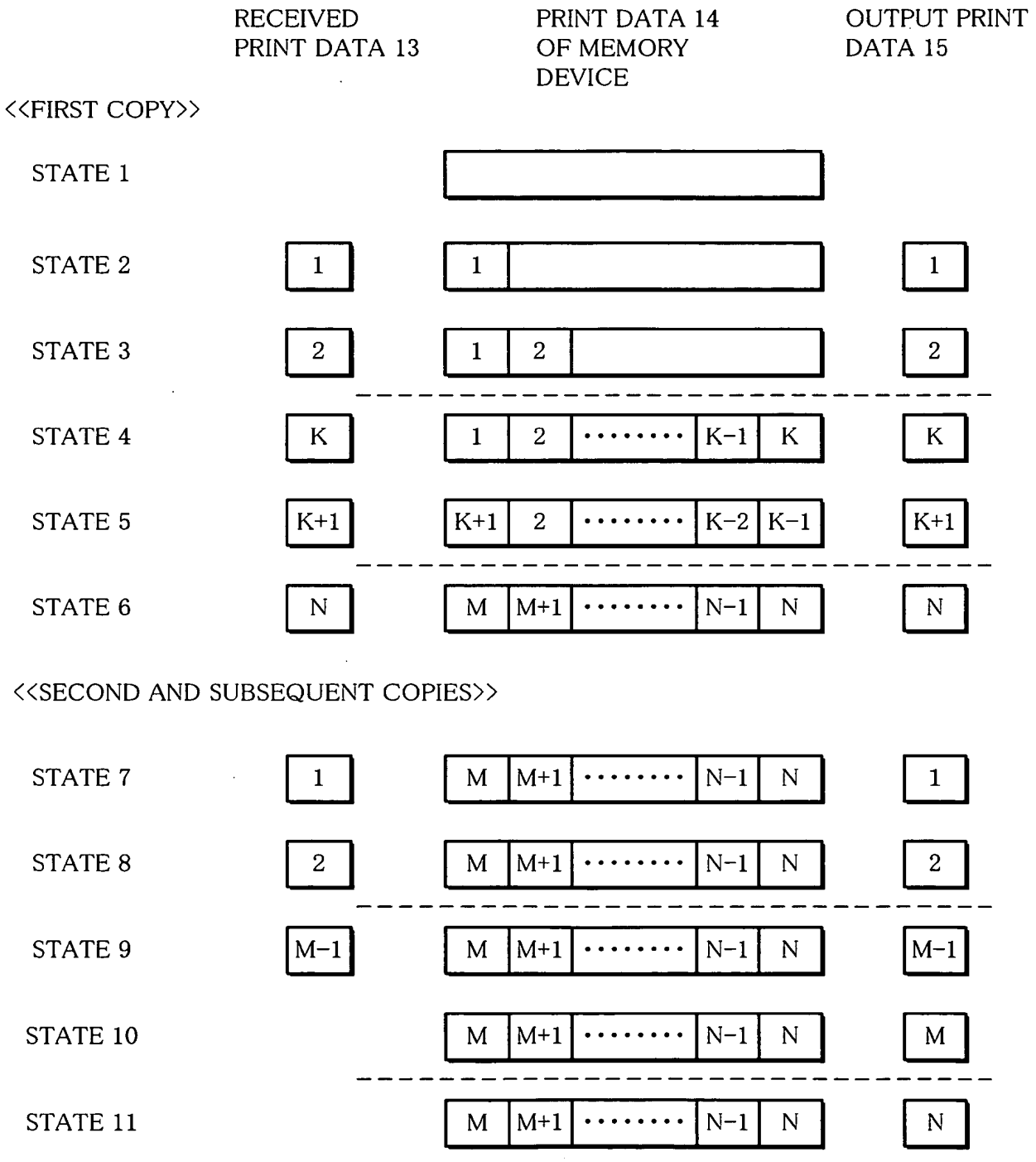

RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE
OUTPUT PRINT DATA 15
<<FIRST COPY>>
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
STATE 6
<<SECOND AND SUBSEQUENT COPIES>>
STATE 7
STATE 8
STATE 9
STATE 10
STATE 11
1
2
K
K+1
N
M
M+1
M-1
K-1
K-2
N-1

FIG. 6

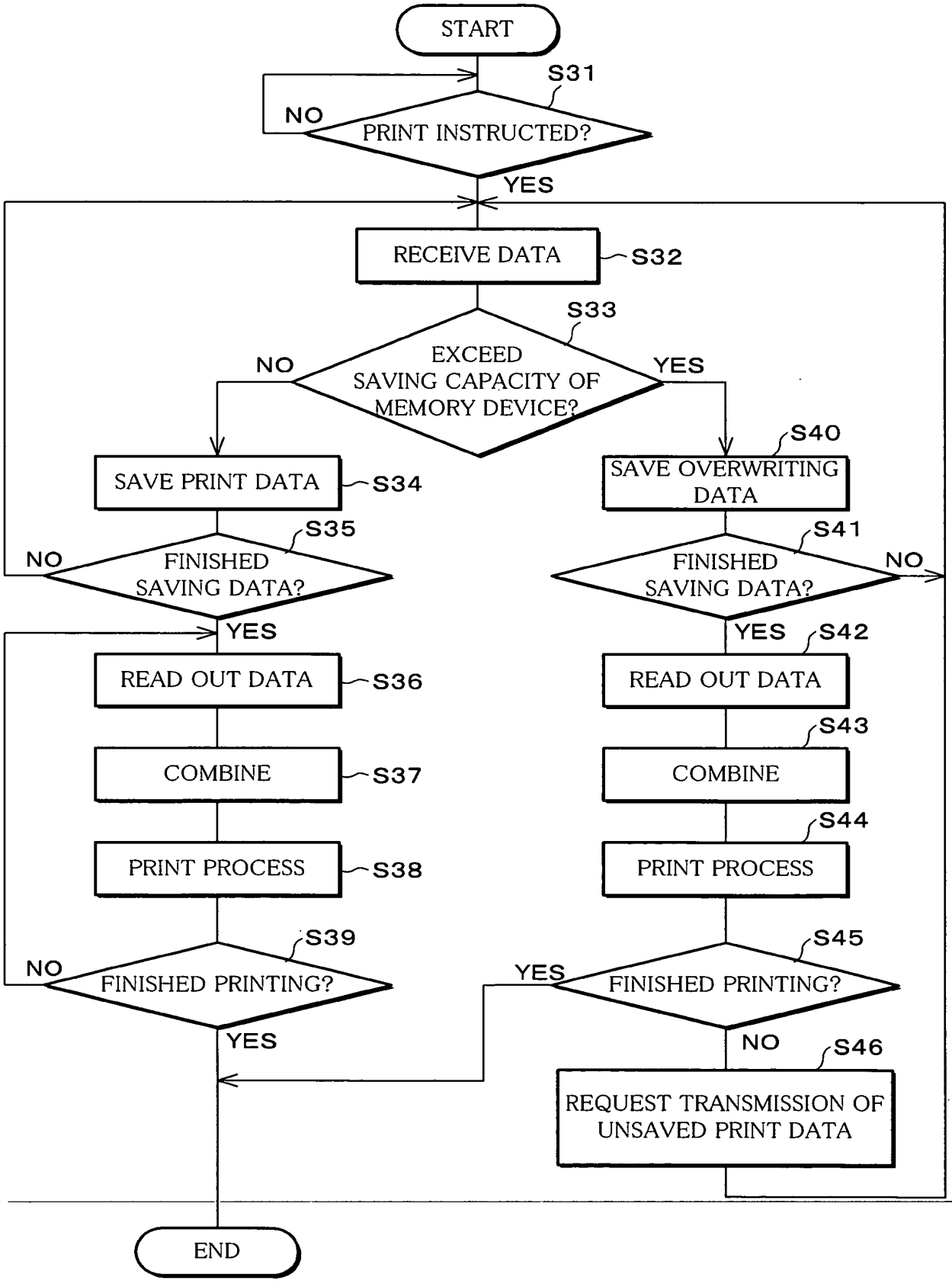

START
S31
NO
PRINT INSTRUCTED?
YES
RECEIVE DATA
S32
S33
NO
EXCEED SAVING CAPACITY OF MEMORY DEVICE?
YES
S40
SAVE PRINT DATA
S34
SAVE OVERWRITING DATA
S35
S41
NO
FINISHED SAVING DATA?
NO
YES
YES
S42
READ OUT DATA
S36
READ OUT DATA
S43
COMBINE
S37
COMBINE
S44
PRINT PROCESS
S38
PRINT PROCESS
S39
S45
NO
FINISHED PRINTING?
YES
FINISHED PRINTING?
YES
NO
S46
REQUEST TRANSMISSION OF UNSAVED PRINT DATA
END

FIG. 7

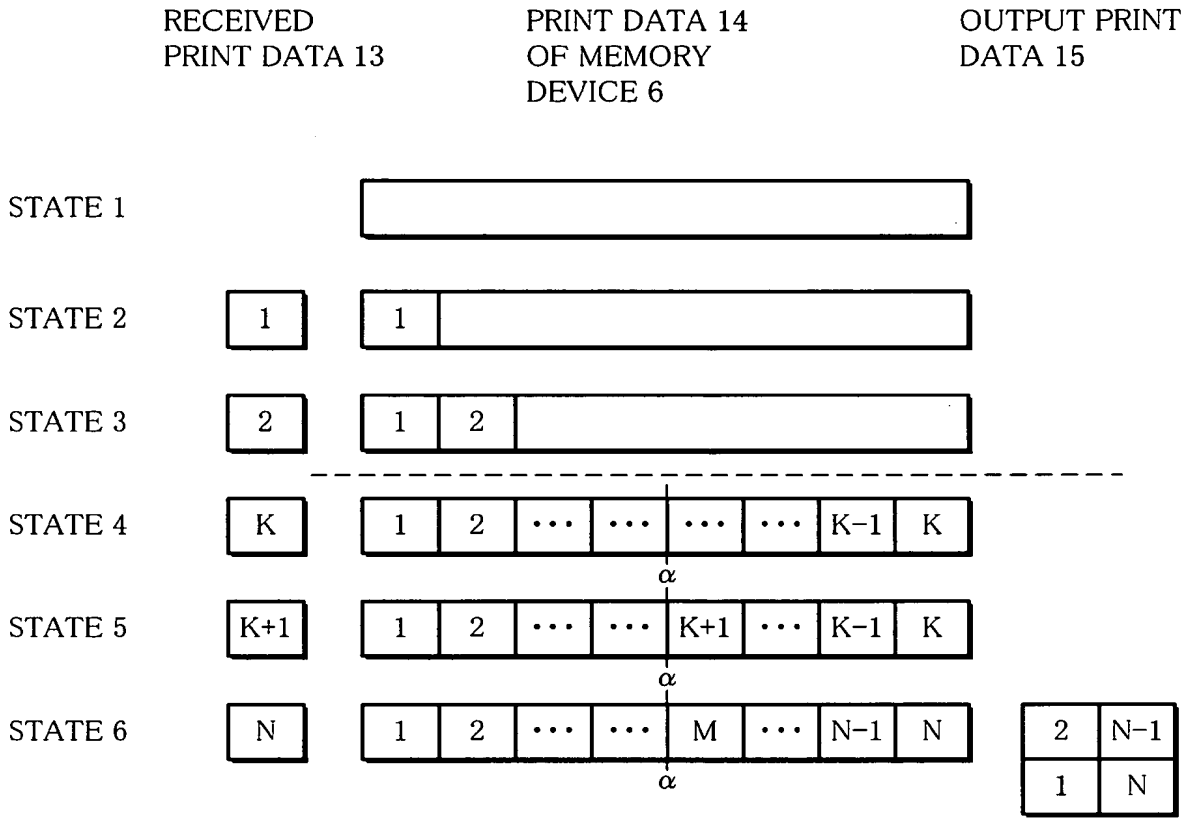

RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE 6
OUTPUT PRINT DATA 15
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
STATE 6
1
2
K
K+1
N
1 2 ••• ••• ••• ••• K-1 K
1 2 ••• ••• K+1 ••• K-1 K
1 2 ••• ••• M ••• N-1 N
α
2 N-1
1 N

FIG. 8

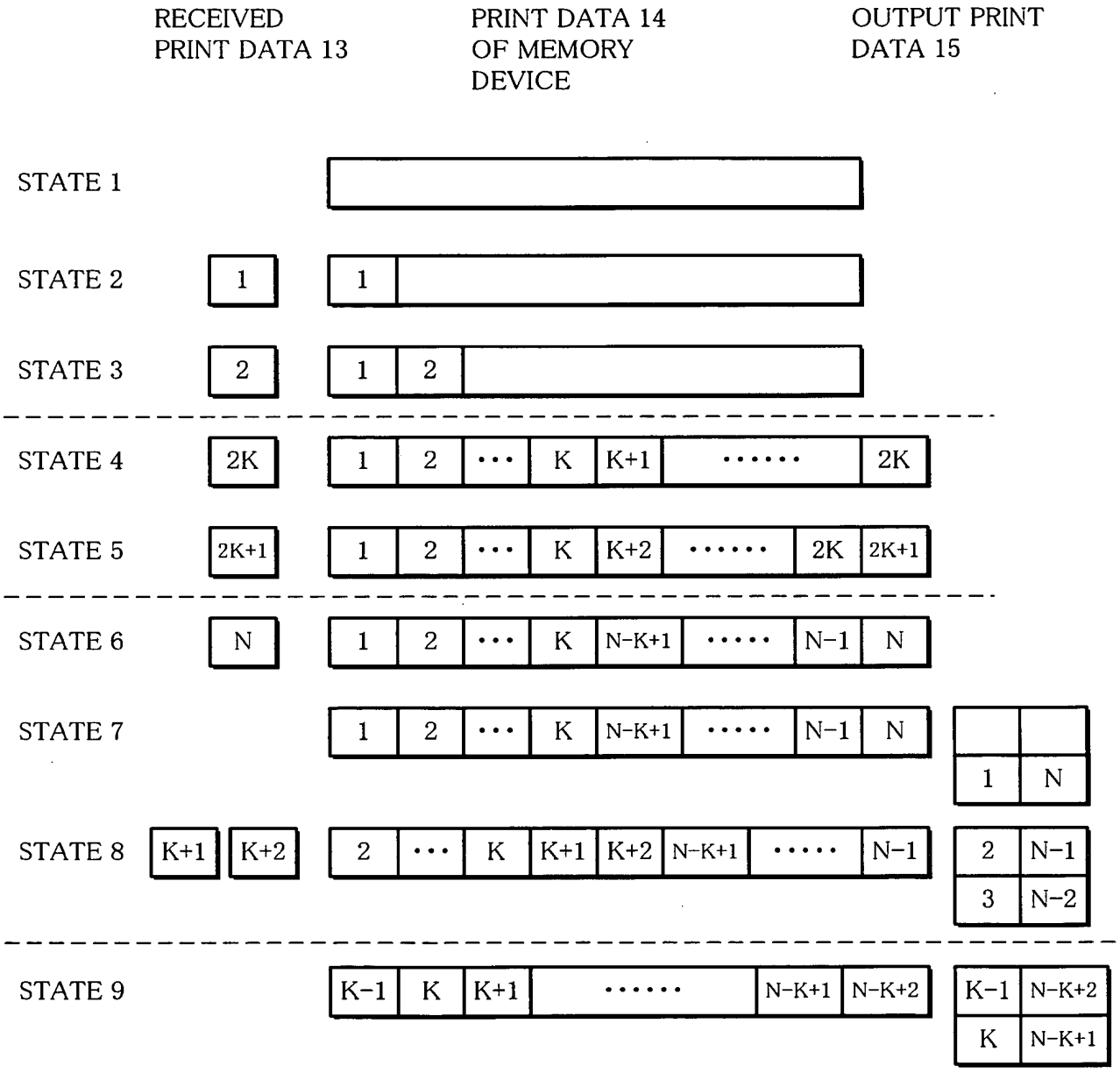

RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE
OUTPUT PRINT DATA 15
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
STATE 6
STATE 7
STATE 8
STATE 9
1
2
2K
2K+1
N
K+1
K+2
K-1
K
K+2
N-K+1
N-K+2
N-1
N-2

FIG. 9 (a)

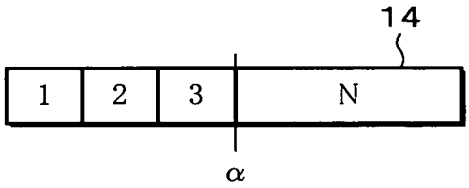


FIG. 9 (a)

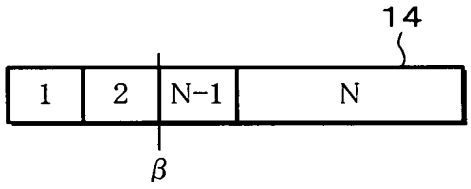


FIG. 10

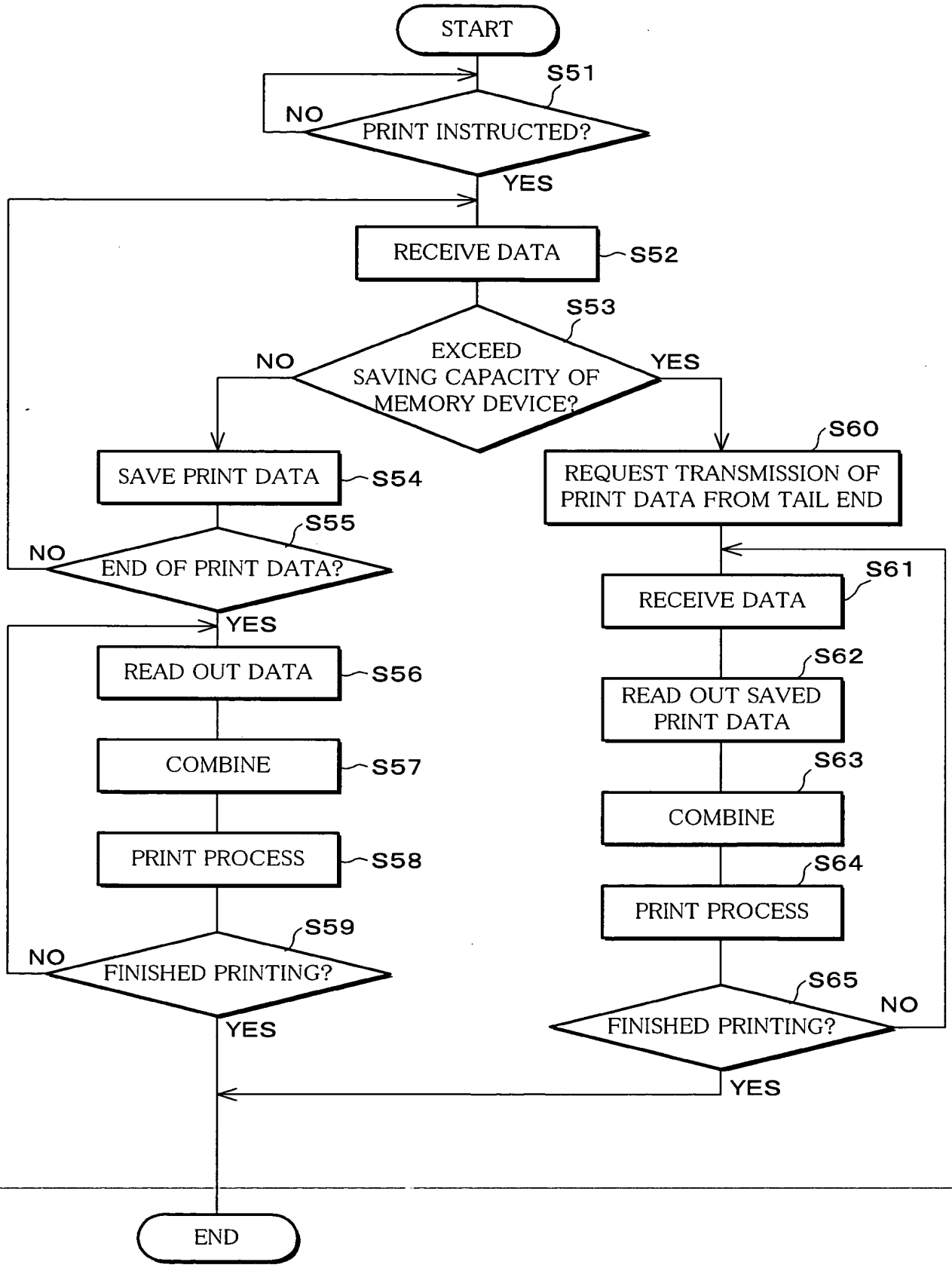

START
S51
NO
PRINT INSTRUCTED?
YES
RECEIVE DATA
S52
S53
NO
EXCEED SAVING CAPACITY OF MEMORY DEVICE?
YES
S60
SAVE PRINT DATA
S54
REQUEST TRANSMISSION OF PRINT DATA FROM TAIL END
S55
NO
END OF PRINT DATA?
YES
S61
RECEIVE DATA
S62
READ OUT DATA
S56
READ OUT SAVED PRINT DATA
S63
COMBINE
S57
COMBINE
S64
PRINT PROCESS
S58
PRINT PROCESS
S59
NO
FINISHED PRINTING?
S65
NO
FINISHED PRINTING?
YES
YES
END

FIG. 11

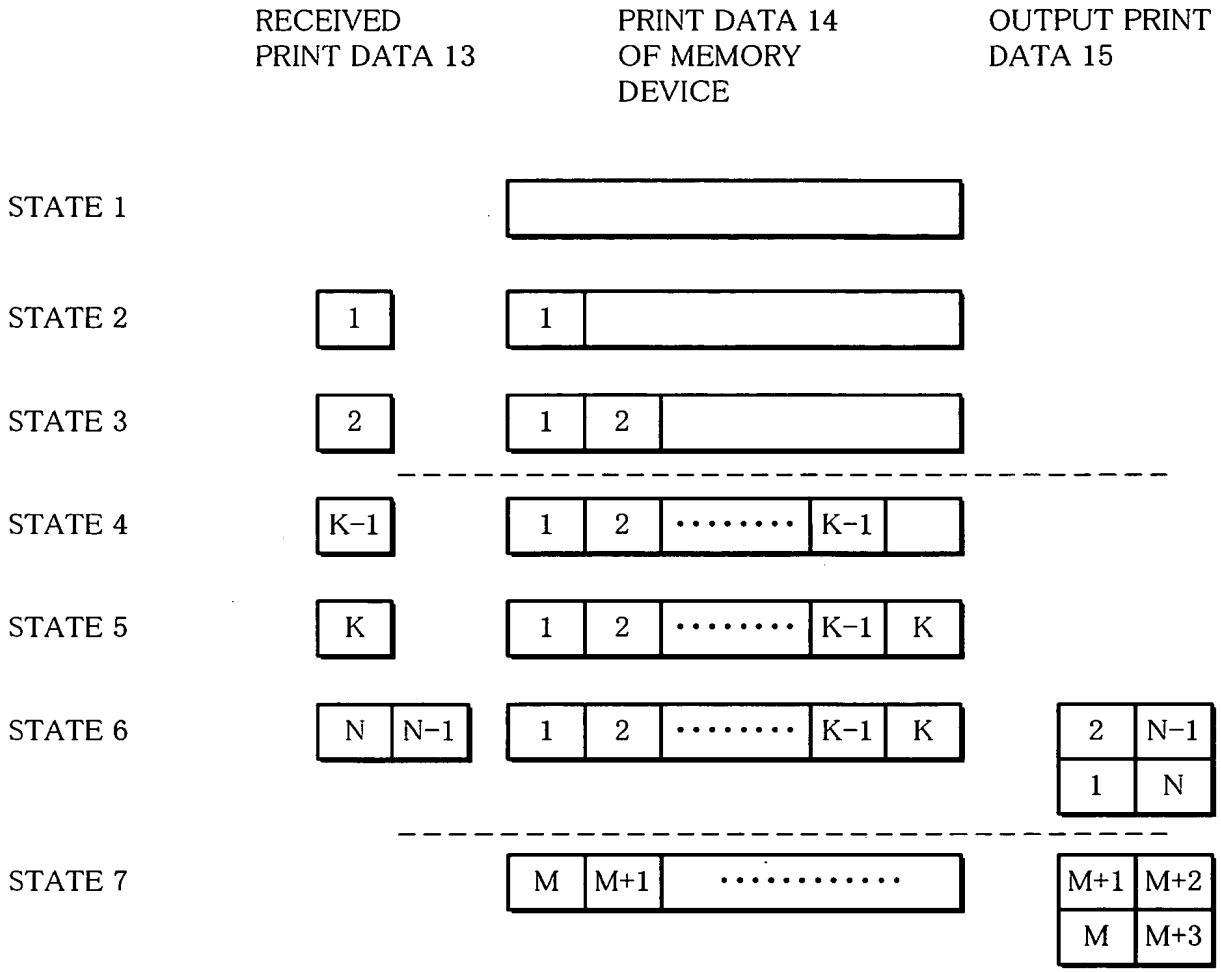
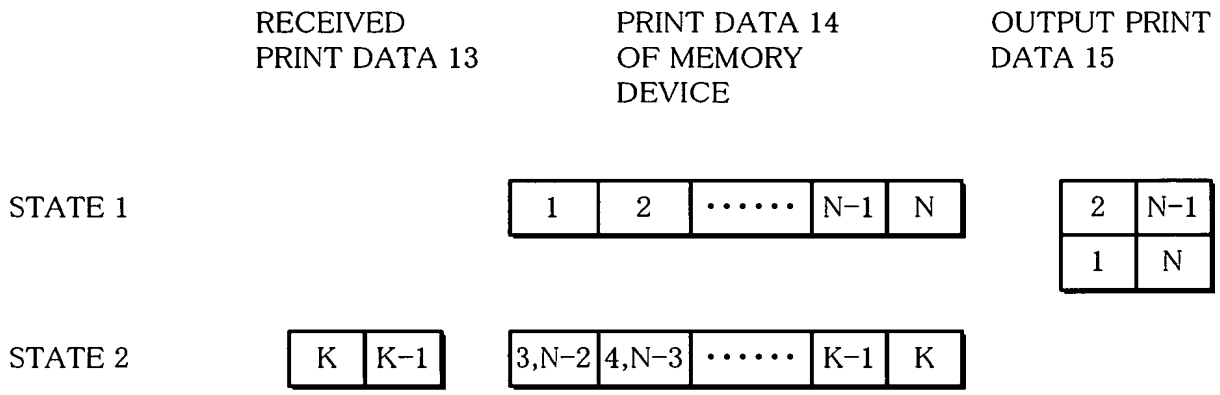

RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE
OUTPUT PRINT DATA 15
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
STATE 6
STATE 7
1
2
K-1
K
N
N-1
M
M+1
2
N-1
1
N
M+1
M+2
M
M+3

FIG. 12


RECEIVED PRINT DATA 13
PRINT DATA 14 OF MEMORY DEVICE
OUTPUT PRINT DATA 15
STATE 1
1
2
N-1
N
2
N-1
1
N
STATE 2
K
K-1
3,N-2
4,N-3
K-1
K